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DIPLOMATE IN ENGINEERING HELMUT ARENDT

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Hubertusstr. 2, 3000 Hanover 1

Hanover 02/14/1986

P 821/A/B Utility Patent Application

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An Apparatus for the Removal of Gallstones

The invention relates to an apparatus for the removal of concrements formed in hollow organs in human beings, for example, gallstones, consisting of a capture basket, comprised of several catch lines, that may be withdrawn into a guide tube with the aid of a pull line.

For the removal of concrements in the human body, devices having a capture basket, to which a pull line is attached, are known. The pull line may be moved into a guide tube after the manner of a Bowden wire. A capture basket consists of several monofilaments or braided pieces of spring steel wire. The latter are connected to a pull line and are formed in such a way that in the slack state, due to their curvatures toward the outside, they form a commonly shared internal space, and, they can surround a rather large piece of concrement that cannot leave

the body via the natural route. As a result of withdrawal into the guide tube, which can be effected solely by pulling on the outer end of the pull line, external pressure is exerted on the entrapped bodily concrement, for example, a gallstone. In the process, the individual wire pieces of the capture basket serve as cutting edges. Body concrements which cannot, as a result of their size, leave the body in the natural way, are reduced in size in this manner. Smaller stones, by contrast, even after entrapment using the basket, can be withdrawn from the body cavity and recovered. One example of such an apparatus is presented and explained in the DE-GM [German utility patent] 85 01 297.1.

In order to be able to exert sufficient pull on the capture basket, the outer end of the pull line is equipped with a rigid handle in the form of a casing.

To recover a gallstone, for example, a capture basket, with its pull line within an endoscope, is introduced into the gall duct via the esophagus, the stomach, and the duodenum. The capture basket is advanced beyond gallstones situated therein. Then, by pulling on the outer rigid, casing-like handle, the pull wire can be tightened and the gallstone can be pulled out of the gall duct into the duodenum. From there, it migrates outward, either by way of the remainder of the intestinal tract, or, it can be recovered together with the endoscope.

In many cases, the stones are of such great dimension that they cannot be withdrawn from the gall duct without the danger of perforation. In such cases, an attempt is made to break up the stone by contracting the capture basket. A prerequisite for doing so is that the endoscope be removed beforehand, that is,

that it be withdrawn from the pull line. The pull line remains in the patient's body. The removal of the endoscope, however, is prevented by the rigid handle on the outer end of the pull line. It is not possible to pull the endoscope, with its lower lateral opening, over the rigid handle. To the extent that, in addition, the capture basket can no longer be removed as a consequence of a stone's being too large, and no sufficient forces can be applied to reduce the size of the stone, an operation on the patient cannot be avoided.

The underlying task of the innovation is to embody a capture device for body concrements of the type mentioned at the outset in such a way that simple removal of the endoscope is rendered possible as soon as it becomes apparent that the crushing of the stone will be necessary. The innovation to resolve this task is characterized by the fact that the outer end of the pull line is connected to the handle in such a way that it can be released. Preferably, a screw thread is provided at the handle, which thread engages in a threaded case that measures about 10 mm in length, the opposite end of which is firmly connected to the pull line. The dimensions of the threaded case that is attached to the pull line make it possible to pull the endoscope entirely away from the pull line. The cutting off of the pull line, which has occurred thus far, is avoided by these means. The capture basket is not damaged and it can be used again.

An embodiment example of the innovation is represented schematically in the drawing, and is explained below.

The apparatus, which is designed in accordance with the innovation, consists of a capture basket, 1, and a pull line, 2. The capture basket is constructed of individual catch lines, 4, 5, and 6. The free end of the capture basket engages a case 7, which is connected to the catch lines by being filled with solder, or it may be clamped on. It possesses a shoulder, 8, which, when the pull line is withdrawn in its entirety into guide tube 9, which encases the pull line along its entire length, is applied at one end and prevents withdrawal too far into the tube. In the case of apparatuses for crushing stones, the guide tube customarily consists of a metal spiral that can accept the great forces that are necessary to crush a stone.

At its outer end, the pull line, 2, is firmly attached to a threaded case, 10, into which a drawbar or a handle, 11, with a threaded fitting strip, 12, can engage. The threaded case, 10, is kept as short as possible in order to be able, after the release of the handle, 11, to draw the endoscope or the duodenoscope completely away from the pull line.

If a gallstone cannot be recovered with an endoscope, there is the possibility of unscrewing the handle, 11, which protrudes from the endoscope, or especially the duodenoscope. After the removal, and, if necessary, the application of a metal spiral, the handle can be attached once more, and the stone can be crushed, while being monitored by X-rays if necessary. After crushing, the capture basket can be re-used once it has been properly cleaned.

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PROPRIETARY CLAIMS

1. A device for the removal of concrements that have been formed in the hollow organs of human beings, especially gallstones, that consists of a capture basket formed of several catch lines, that may, with the aid of a pull line, be pulled into a guide tube, and a handle that is attached to the external end of the pull line, characterized by the fact that the handle (11) is connected to the pull line (2) in such a way that it may be detached.
2. An apparatus according to claim 1, characterized by the fact that the outer end of the pull line is connected to a threaded casing in such a manner as to withstand pulling, in which the handle (11) engages with a set of threading (12).
3. An apparatus according to claim 2, characterized by the fact that the threaded casing (10) exhibits a maximum length of 10 mm.

⑩ **Gebrauchsmuster**

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(54) Bezeichnung des Gegenstandes  
Gerät zum Entfernen von Gallensteinen

(71) Name und Wohnsitz des Inhabers  
Paul Drach, Georg, 3000 Bielefeld, DE

(74) Name und Wohnsitz des Vertreters  
Arendt, H., Dipl.-Ing., Pat.-Anw., 3000 Hannover

mit seiner unteren seitlichen Öffnung über den starren Handgriff zu ziehen. Sofern sich außerdem das Fangkörbchen infolge eines zu großen Steines nicht mehr entfernen lässt und keine ausreichenden Kräfte zum Zerkleinern aufnehmen kann, ist eine Operation des Patienten nicht zu umgehen.

Der Neuerung liegt die Aufgabe zu Grunde, ein Fanggerät für Körperkonkremente der eingangs genannten Art so auszubilden, daß ein einfaches Entfernen des Endoskops ermöglicht wird, sobald sich die Zertrümmerung eines Steines als notwendig herausstellt. Die Neuerung zur Lösung dieser Aufgabe zeichnet sich dadurch aus, daß das äußere Ende des Zugseiles lösbar mit dem Handgriff verbunden ist. Vorzugsweise ist an dem Handgriff ein Schraubgewinde vorgesehen, welches in eine ca. 10 mm lange Schraubhülse greift, dessen gegenüberliegendes Ende fest mit dem Zugseil verbunden ist. Die Abmessungen der an dem Zugseil befestigten Schraubhülse gestattet es, das Endoskop vollständig vom Zugseil abzuziehen. Das bisherige Abschneiden des Zugseiles wird dadurch vermieden. Das Fangkörbchen wird nicht beschädigt und kann wieder verwendet werden.

In der Zeichnung ist ein Ausführungsbeispiel der Neuerung schematisch dargestellt und nachstehend erläutert.

Das neuerungsgemäß gestaltete Gerät besteht aus einem Fangkörbchen 1 und einem Zugseil 2. Das Fangkörbchen wird durch einzelne Fangseile 4, 5 und 6 gebildet. Das freie Ende des Fangkörbchens greift in eine Hülse 7, die sowohl durch Ausfüllung mit Lot mit den Fangseilen verbunden ist oder aufgeklemmt sein kann. Sie besitzt einen Absatz 8, der sich beim vollständigen Einziehen des Zugseiles in den Führungs- schlauch 9, der das Zugseil auf seiner ganzen Länge umhüllt,

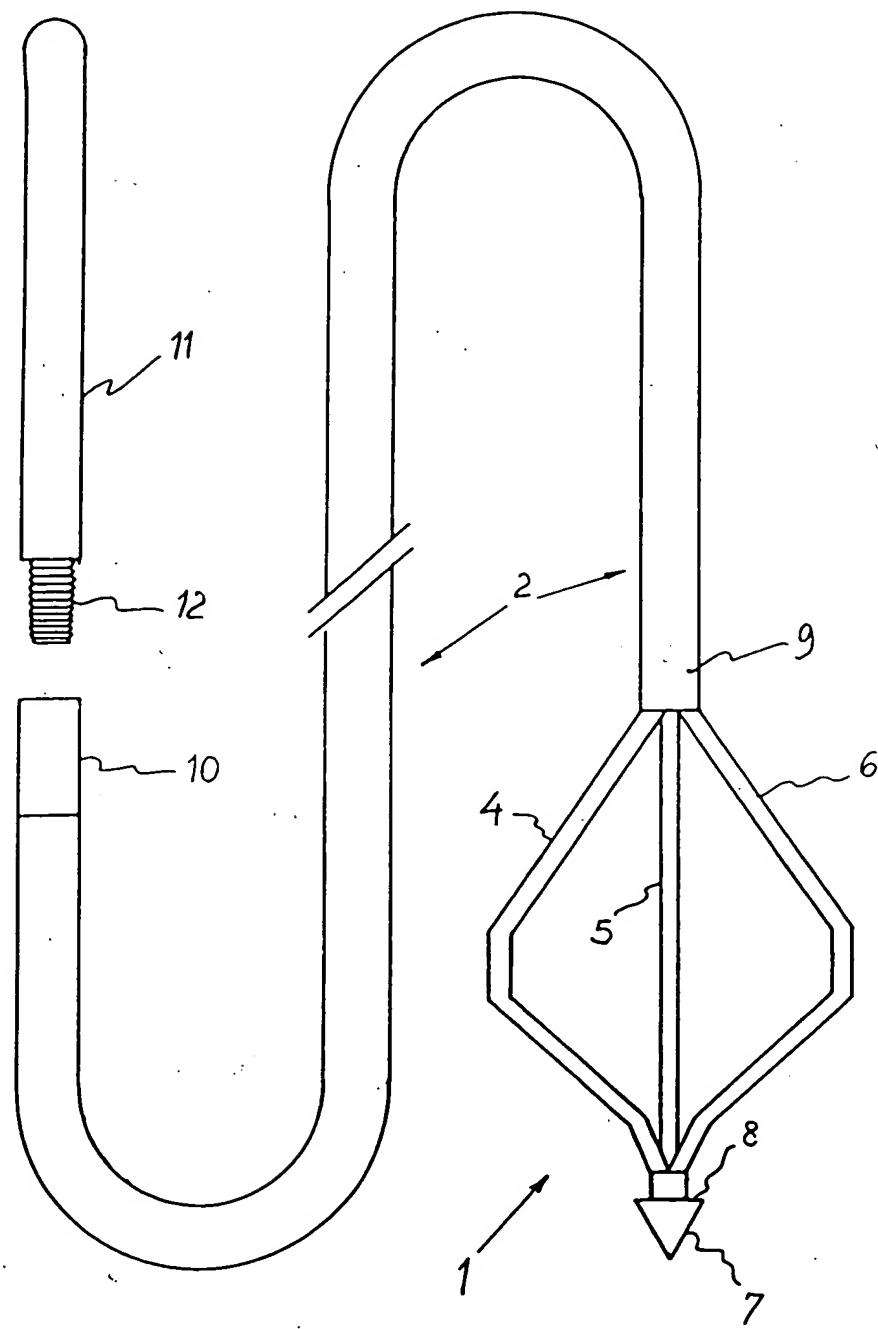
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an dessen Ende anlegt und ein zu weites Einziehen in den Schlauch verhindert. Bei Geräten zur Steinzertrümmerung besteht der Führungsschlauch üblicherweise aus einer Metallspirale, die die zum Zerschneiden eines Steines notwendigen großen Kräfte aufnehmen kann.

An seinem äußeren Ende ist das Zugseil 2 fest mit einer Gewindeglocke 10 verbunden, in welche eine Zugstange bzw. ein Handgriff 11 mit einem Gewindeansatz 12 greifen kann. Die Gewindeglocke 10 ist so kurz wie möglich gehalten, um nach dem Lösen des Handgriffs 11 das Endoskop bzw. das Duodenoskop von dem Zugseil vollständig abziehen zu können.

Kann ein Gallenstein nicht mit einem Endoskop geborgen werden, besteht die Möglichkeit, den aus dem Endoskop, insbesondere Duodenoskop herausragenden Handgriff 11 abzuschrauben und das Endoskop abzuziehen. Nach dem Entfernen und gegebenenfalls Überschieben einer Metallspirale kann der Handgriff wieder befestigt und der Stein gegebenenfalls unter Röntgenkontrolle zertrümmt werden. Nach der Zertrümmerung ist das Fangkörbchen nach entsprechender Reinigung erneut verwendbar.

15.02.96



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